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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/645,690	08/24/2000	Lizhong Sun	4215/PDD/CMP/RKK	4428

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EXAMINER

WINTER, GENTLE E

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 07/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

AS-66

Office Action Summary

Application No. 09/645,690	Applicant(s) SUN ET AL.	
Examiner Gentle E. Winter	Art Unit 1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18,26-31 and 33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18,26-31 and 33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 December 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☒ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/17/2003 has been entered.

Oath/Declaration

2. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:

Non-initialed and/or non-dated alterations have been made to the oath or declaration. See 37 CFR 1.52(c).

Claim Rejections - 35 USC § 112—Withdrawn

3. Claims 26-32 were rejected under 35 U.S.C. 112, first paragraph, for lack of enablement. Applicant's amendments and arguments have overcome this rejection. Specifically the recitation of "surface of a polishing pad". This narrowing limitation makes the claim enabled.

4. Claims 4 and 15 were rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification. The amendment current amendment appears to overcome the rejection. It is presumed that applicant's reference to claim 5 was intended to be a reference to claim 4. (Page 7 of paper 14).

5. Claims 26-32 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite. Applicant's amendments and arguments have overcome/obviated the rejection. The cancellation of claim 32 is further noted.

Claim Objections--Withdrawn

6. Claims 4, 5, and 15 were objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant amendments have overcome the objection to claims 4 and 15.

The objection to claim 5, was objected to because it was not clear what additional method steps were contemplated. The method appeared to be drawn to describing a property. Applicant's amendment does not provide an active step, but now is drawn to describing a property. Pursuant to the doctrine of claim interpretation it will be assumed that claims 1 and 5 do not have the same scope. Thus it is assumed that the matter of claim 5 is not inherently in claim 1.

7. Claim 32 is cancelled, and as such the objection is moot.

Response to Arguments

8. Initially, it is noted that there appears to be a minor typographical error. Paper 14 appears to indicate that there is no claim 33 currently pending, and that claim 32 is pending. It is assumed, consistent with applicant's remarks that claim 32 is cancelled and claim 33 is pending. (Page 6 of paper 14). Further, it is presumed that the reference to claim 5, at page 7, was

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intended to be a reference to claim 4. (Page 7 of paper 14). The above were treated in a manner that is consistent with the presented arguments.

9. Applicant argued that Small does not teach, show, or suggest cleaning a polishing pad surface as recited in claims 1, 12, 26.

And continued that Small does not teach, show, or suggest, applying a cleaning composition to a polishing pad surface as disclosed in claims 1, 12, and 26.

10. Applicant has argued that figure 3 of the *Small* reference illustrates:

the corrosion rate of aluminum wafer versus the amount of amines dissolved in a water rinse system to show that small quantities of amines will be very corrosive to the metal on the wafer, such as about 3-20% or less of amines in water, as disclosed see e.g. (column 3, lines 7-10). Therefore, *Small et al.* teaches away from the use of about 3-20% or less of amines in their post clean treatment composition because it can cause corrosion of metal structures on a wafer.

11. Applicant's arguments are not persuasive because they argue limitations not in the claims. The claims are drawn to an amine concentration of 0.1 to 3.0 Wt%.

12. The response to the obviousness arguments appears to be nothing more than a parsing of the patents and arguing that neither patent fully discloses the each and every limitation. Since the rejection is an *obviousness* rejection, and two references are relied upon *in the aggregate*.

The combined references provide each and every element of the claimed invention and explicitly provide the motivation for making the combination. As such the arguments are not persuasive.

13. The new claims are similarly rejected for the reasons set forth below.

Claim Rejections - 35 USC § 102—Withdrawn

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-3, 8, 26, 27 and 33, were rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,981,454 to Small.
2. Applicant's arguments are considered persuasive. The claims are understood to recite that the solution is applied to the pad, and not to a wafer, as is disclosed in Small. The incidental application of solution pursuant to the pad's contact with the wafer is not consistent with a pad *cleaning* step, this step is actually more likely to load the pad with contaminants than it is to clean the pad. As such the rejection is withdrawn.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3, 8, 12-14, 16, 26, 27 and 33 rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 5,981,454 to Small and United States Patent No. 6,352,595 to Svirchevski et al.

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4. Small discloses a method of cleaning a wafer using a polishing pad see e.g. column 2 55. Small discloses applying to the wafer a cleaning composition comprising a composition that has an amine concentration that includes at least one endpoint of the claimed range, specifically 3.0 Wt% of at least one organic compound containing one or more amine or amide groups. It is noted that the solution is applied to the polishing pad surface by transfer from the wafer of Small. Small discloses this at e.g. column 2, line 55 *et seq.* The explicitly disclosed range is 3-20% (column 3, line 52 *et seq.*) however figure 3 appears to contemplate a range of activity below 3% (see e.g. column 4, line 6 *et seq.* and also see figure 3). Small further discloses an acid or base such that the composition has a pH of between 3.5 and 7, which anticipates the range 5.0 to about 12.0, and water. See (column 2, line 37 *et seq.* and column 3, line 52 *et seq.*). Small further discloses using DI water, ethylene diamine, and acetic acid (column 14, line 43 through column 16). A water rinse is also disclosed (column 1, line 38 *et seq.*). It is noted that the argument that the Small reference is drawn applying the cleaning solution to the pad and not the wafer is not persuasive because applying the solution to the wafer is deemed an intermediate step. In the end the solution *is* applied to the cleaning pad. If applicant wants to recite that the cleaning solution is applied *directly* to the pad, such would seemingly distinguish the instant claims over Small. However, it follows that a solution that is effective for removing compounds from the wafer would similarly be effective for removing compounds from a pad.

5. With respect to claim 12 and dependant claims, the arguments and claim recitation of a *first* and *second* wafer and an intermediate cleaning step precludes the possibility of a wafer being present during the cleaning and as such the anticipation rejection is withdrawn.

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6. The secondary reference provides the missing element and Small explicitly provides the motivation for making the instant combination. Specifically, Svirchevski discloses a method of cleaning a chemical mechanical polishing (CMP) pad that has already been used for performing a CMP operation on a wafer surface, the CMP pad having a residue on a surface of the CMP pad, the method includes applying chemicals to the surface of the CMP pad and thereafter rinsing the pad. The chemical disclosed in Small is disclosed to be useful because it eliminates the need for flammable solvents, lowers transition metal ion concentrations, and has a high neutralization capacity. The rationale for cleaning between a first and second wafer would include minimization of contamination build-up and minimization of subsequent bath contamination.

7. Claims 12-14, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Small as set forth above and United States Patent No. 6,352,595 to Svirchevski et al.

8. Claims 12-14 and 16 disclosing the sequential steps of conducting a CMP on a first wafer surface of a first wafer containing copper or copper based alloy on a surface-polishing pad. It is not altogether clear if “water” was intended to be “wafer”. Thereafter the first wafer is removed from the pad, and cleaning composition is applied to the pad, followed by a rinsing step. Finally, a second wafer is provided and the above steps are repeated. The composition is identically disclosed in Small as set forth above. What is not explicitly disclosed is the cleaning of the pad between polishing a first wafer and second wafer. This sequential order appears to require that a wafer is not take part of the pad cleaning operation. This inference is supported by the terms “sequential” and the identification of a “first” and a “second” wafer, which are not in contact with the pad during the cleaning operation. Because the each and every limitation of the claim is not identically disclosed, and is apparently not inherent the anticipation rejection is withdrawn

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at this time. The secondary reference provides the missing element and Small explicitly provides the motivation for making the instant combination. Specifically, Svirchevski discloses a method of cleaning a chemical mechanical polishing (CMP) pad that has already been used for performing a CMP operation on a wafer surface, the CMP pad having a residue on a surface of the CMP pad, the method includes applying chemicals to the surface of the CMP pad and thereafter rinsing the pad. The chemical disclosed in Small is disclosed to be useful because it eliminates the need for flammable solvents, lowers transition metal ion concentrations, and has a high neutralization capacity. The rationale for cleaning between a first and second wafer would include minimization of contamination build-up and minimization of subsequent bath contamination.

9. Claims 4-7, 9-11, and 28-31, as currently understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Small and United States Patent No. 6,280,299 to Kennedy.

10. Each and every limitation of claims 6, 7, 9, 10, and 11 are identically disclosed in Small, except that Small apparently fails to explicitly disclose applying the solution to a rotating polishing pad at a flow rate of about 10 to 600 ml/min. Kennedy et al. discloses using a flowrate between 230 and 6000 ml/min (e.g. column 6, line 58 *et seq.*). The artisan would have been motivated to make the instant combination for the reasons explicitly set forth in Kennedy et al. Kennedy discloses that the pad cleaning flowrates and pressures are optimized based on the conditions and materials used in the pad cleaning process. In a larger sense, the artisan would have been motivated to select a flow rate high enough to reduce the pad loading to an acceptable level, while minimizing solvent waste. Similarly, it is submitted that duration of the flow would

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be a matter of routine optimization, but is explicitly disclosed in Kennedy et al. as about 5 to 20 seconds (see e.g. column 7, line 47 *et seq.*). Again the motivation is explicitly disclosed in Kennedy et al. specifically, optimizing the cleaning of the pad. Further, Kennedy et al. and the instant invention appear to be performing substantially the same task, in substantially the same way, for substantially the same reason.

11. With specific respect to claims 4 and 28 the claims, as amended disclose a pH range of “about 8 to about 11”. While these values may not be contextually taught with identical values the taught value of “about 7” seemingly would read on “about 8”, however if it is asserted that there are real material differences observed between a pH of 7 and a pH of 8 seemingly such evidence would overcome the obvious rejection. But note that pH values of greater than 10 (and therefore including 11) are disclosed in Small, see e.g. column 4, line 3.

12. Claims 15, 17, and 18 rejected under 35 U.S.C. 103(a) as being unpatentable over Small Svirchevski and Kennedy as set forth above.

13. Each and every limitation of claims 17, and 18 is disclosed in the combination of Small and Svirchevski as set forth above with respect to claim 12, except that Small and Svirchevski apparently fail to explicitly disclose applying the solution to a rotating polishing pad at a flow rate of about 10 to 600 ml/min. Kennedy et al. discloses using a flowrate between 230 and 6000 ml/min (e.g. column 6, line 58 *et seq.*). The artisan would have been motivated to make the instant combination for the reasons explicitly set forth in Kennedy et al. Kennedy discloses that the pad cleaning flowrates and pressures are optimized based on the conditions and materials used in the pad cleaning process. In a larger sense, the artisan would have been motivated to

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select a flow rate high enough to reduce the pad loading to an acceptable level, while minimizing solvent waste. Similarly, it is submitted that duration of the flow would be a matter of routine optimization, but is explicitly disclosed in Kennedy et al. as about 5 to 20 seconds (see e.g. column 7, line 47 *et seq.*). Again the motivation is explicitly disclosed in Kennedy et al. specifically, optimizing the cleaning of the pad. Further, Kennedy et al. and the instant invention appear to be performing substantially the same task, in substantially the same way, for substantially the same reason.

14. With specific respect to claim 15 the claim, as amended discloses a pH range of “about 8 to about 11”. While these values may not be contextually taught with identical values the taught value of “about 7” seemingly would read on “about 8”, however if it is asserted that there are real material differences observed between a pH of 7 and a pH of 8 seemingly such evidence would overcome the obvious rejection. But note that pH values of greater than 10 (and therefore including 11) are disclosed in Small, see e.g. column 4, line 3.

Conclusion

15. Applicant is cordially invited to contact this examiner at the number below if applicant believes that an interview may assist in the identification of allowable subject matter.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gentle E. Winter whose telephone number is (703) 305-3403.

The examiner can normally be reached on Monday-Friday, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy P. Gulakowski can be reached on (703) 308-4333. The fax phone numbers for

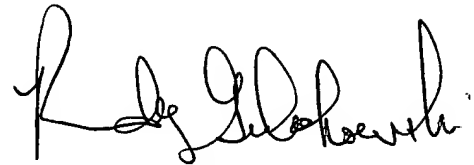
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the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Gentle E. Winter
Examiner
Art Unit 1746

July 23, 2003

A handwritten signature in black ink, appearing to read "Randy Gulakowski", is written over a faint, larger signature.

RANDY GULAKOWSKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700